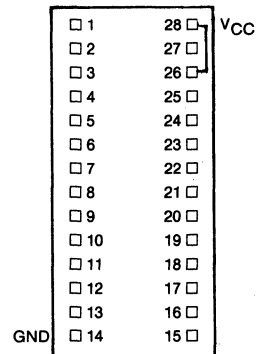


**FEATURES**

- Accepts standard 2K × 8 and 8K × 8 CMOS static RAMs
- Embedded lithium energy cell retains RAM data
- Self-contained circuitry safeguards data
- Data retention time is greater than 10 years with the proper RAM selection
- IC socket permits upgrading from 2K × 8 to 8K × 8 RAM
- Proven gas-tight socket contacts
- Operating temperature range 0°C to 70°C

**PIN CONNECTIONS**



**PIN NAMES**

All pins pass through except 20, 26, 28.

Pin 20  $\overline{CE}$  - Conditioned Chip Enable

Pin 26 V<sub>CC</sub> - Switched V<sub>CC</sub> for 24-pin RAM

Pin 28 V<sub>CC</sub> - Switched V<sub>CC</sub> for 28-pin RAM

Pin 14 GND - Ground

**DESCRIPTION**

The DS1213 is a 28-pin, 0.6-inch-wide DIP socket with a built-in CMOS controller circuit and an embedded lithium energy source. It accepts either 28-pin 8K × 8 or 24-pin 2K × 8 lower-justified JEDEC byte wide CMOS static RAM. When the socket is mated with a CMOS RAM, it provides a complete solution to problems associated with memory volatility. The SmartSocket monitors incoming V<sub>CC</sub> for an out-of-tolerance condition. When such a condition occurs, an internal lithium source is automatically switched on and write protection is unconditionally enabled to prevent garbled data.

Using the SmartSocket saves printed circuit board space since the combination of SmartSocket and memory uses no more area than the memory alone. The SmartSocket uses only Pins 28, 26, 20 and 14 for RAM control. All other pins are passed straight through to the socket receptacle.

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## OPERATION

The DS1213 SmartSocket performs five circuit functions required to battery back-up a CMOS memory. First, a switch is provided to direct power from the battery or  $V_{CC}$  supply, depending on which is greater. This switch has a voltage drop of less than 0.2 volts. The second function which the SmartSocket provides is power fail detection. Power fail detection occurs between 4.75 and 4.5 volts. The DS1213 constantly monitors the  $V_{CC}$  supply. When  $V_{CC}$  falls below 4.75 volts, a precision comparator detects the condition and inhibits the RAM chip enable. The third function accomplishes write protection by holding the chip enable signal to the memory to within 0.2 volts of  $V_{CC}$  or battery supply. If the chip enable signal is active at the time power fail detection occurs, write protection is delayed until after the memory cycle is complete to avoid corruption of data. During nominal power supply conditions the memory chip enable signal will be passed through to the socket receptacle with a maximum propagation delay of 20 ns. The fourth function the DS1213 performs is to check battery status to warn of potential data loss. Each time that  $V_{CC}$  power is restored to the SmartSocket the battery voltage is checked with a precision comparator. If the battery supply is less than 2.0 volts, the second memory cycle is inhibited. Battery status can, therefore, be determined by performing a read cycle after power up to any location in the memory, recording that memory location content. A subsequent write cycle can then be executed to the same memory location, altering the data. If the next read cycle fails to verify the written data, the contents of the memory are questionable. The fifth function which the SmartSocket provides is battery redundancy. In many applications, data integrity is paramount. In these applications it is desirable to use two batteries to insure reliability. The DS1213 SmartSocket provides an internal isolation switch which provides for the connection of two batteries. During battery back-up time the battery with the highest voltage is selected for use. If one battery fails, the other will automatically take over. The switch between batteries is transparent to the user. A battery status warning will occur if both batteries are less than 2.0 volts. Each of the two lithium cells contains 35 mAh capacity, making the total 70 mAh.

**NOTE:** As shipped from Dallas Semiconductor, the lithium energy cell cannot be measured from the  $V_{CC}$  pin. In order to read the cell potential, apply  $V_{CC}$  and then remove power. The cell potential will then be available on Pins 26, 28, and 20.

**ABSOLUTE MAXIMUM RATINGS\***

Voltage on any Pin Relative to Ground -1.0V to +7.0V

Operating Temperature 0°C to 70°C

Storage Temperature -40°C to +70°C

Soldering Temperature 260°C for 10 Sec

\*This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

**RECOMMENDED D.C. OPERATING CONDITIONS**

(0°C to 70°C)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
PIN 26 L, PIN 28 L Supply Voltage	V <sub>CC</sub>	4.75	5.0	5.5	V	1,3
Logic 1 PIN 20 L	V <sub>IH</sub>	2.2		V <sub>CC</sub> +0.3	V	1,3
Logic 0 PIN 20 L	V <sub>IL</sub>	-0.3		+0.8	V	1,3

**D.C. ELECTRICAL CHARACTERISTICS**(0°C to 70°C, V<sub>CC</sub> = 4.75 to 5.5V)

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTES
PIN 26 L, PIN 28 L Supply Current	I <sub>CC</sub>			5	mA	3, 4, 5
PIN 26 U, PIN 28 U Supply Voltage	V <sub>CCO</sub>	V <sub>CC</sub> -0.2			V	3, 8
PIN 26 U, PIN 28 U Supply Current	I <sub>CCO</sub>			80	mA	3, 8
PIN 20 L $\overline{CE}$ Input Leakage	I <sub>IL</sub>	-1.0		+1.0	μA	3, 4
PIN 20 U $\overline{CE}$ Output @ 2.4V	I <sub>OH</sub>	-1.0			mA	2, 3
PIN 20 U $\overline{CE}$ Output @ .4V	I <sub>OL</sub>			4.0	mA	2, 3

(0°C to 70°C, V<sub>CC</sub> < 4.5V)

PIN 20 U Output	V <sub>OHL</sub>	V <sub>CC</sub> -0.2 V <sub>BAT</sub> -0.2			V	3
PIN 26 U, PIN 28 U Battery Current	I <sub>BAT</sub>			1	μA	3, 6
PIN 26 U, PIN 28 U Battery Voltage	V <sub>BAT</sub>	2	3	3.6	V	3

**CAPACITANCE** $(t_A = 25^\circ\text{C})$ 

PARAMETER	SYMBOL	MAX	UNITS	NOTES
Input Capacitance PIN 20 L	$C_{IN}$	5	pF	3
Output Capacitance PIN 20 U	$C_{OUT}$	7	pF	3

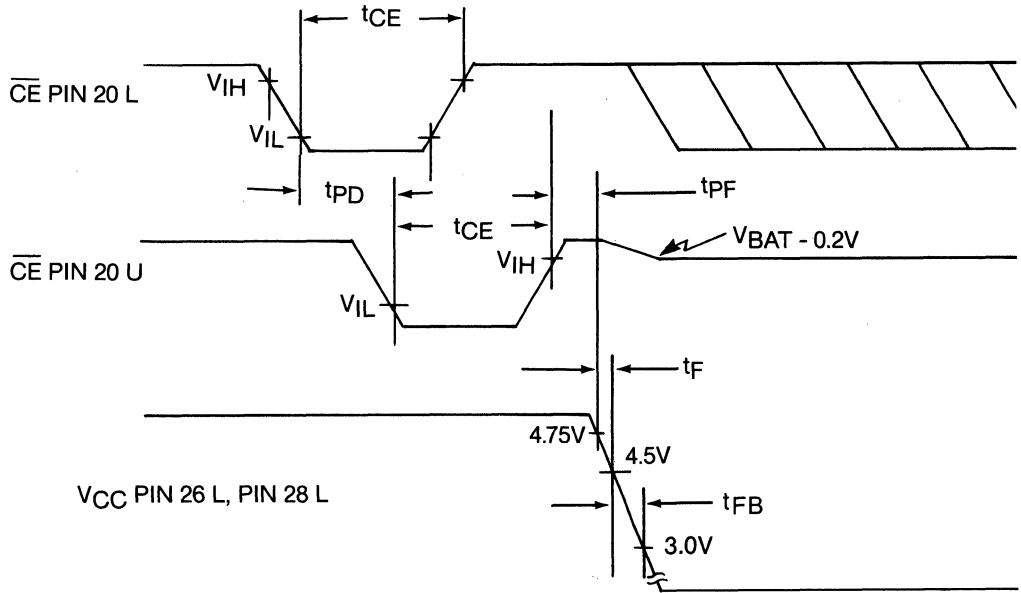
**A.C. ELECTRICAL CHARACTERISTICS** $(0^\circ\text{C to } 70^\circ\text{C}, V_{CC} = 4.75 \text{ to } 5.5\text{V})$ 

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
$\overline{CE}$ Propagation Delay	$t_{PD}$	5	10	20	ns	2,9
$\overline{CE}$ High to Power Fail	$t_{PF}$			0	ns	

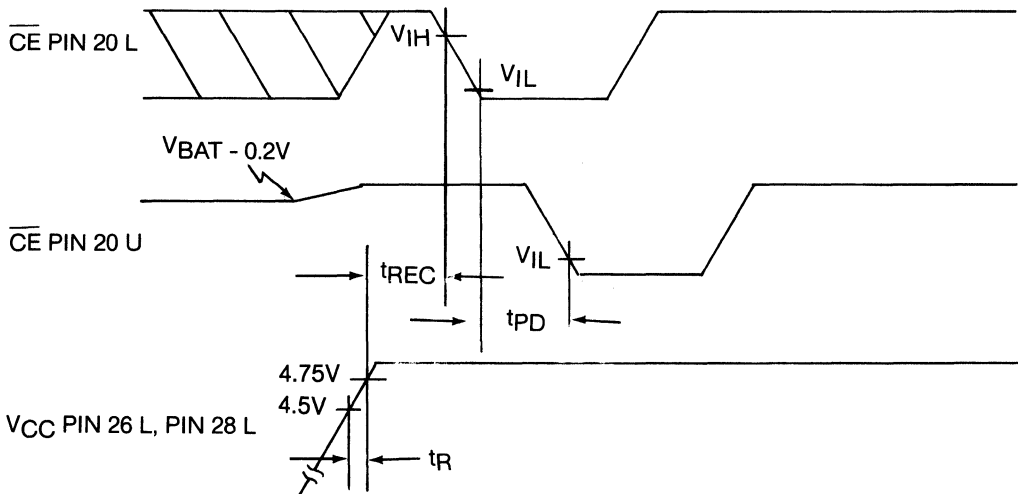
 $(0^\circ \text{ to } 70^\circ\text{C}, V_{CC} = 4.75 \text{ to } 5.5 \text{ V})$ 

Recovery at Power Up	$t_{REC}$	2	80	125	ms	
$V_{CC}$ Slew Rate 4.75 - 4.5 V	$t_F$	300			$\mu\text{s}$	
$V_{CC}$ Slew Rate 4.5 - 3 V	$t_{FB}$	10			$\mu\text{s}$	
$V_{CC}$ Slew Rate 4.5 - 4.75 V	$t_R$	0			$\mu\text{s}$	
$\overline{CE}$ Pulse Width	$t_{CE}$			1.5	$\mu\text{s}$	7

## TIMING DIAGRAM—POWER DOWN



## TIMING DIAGRAM—POWER UP



### WARNING

Under no circumstances are negative undershoots, of any amplitude, allowed when device is in battery backup mode.

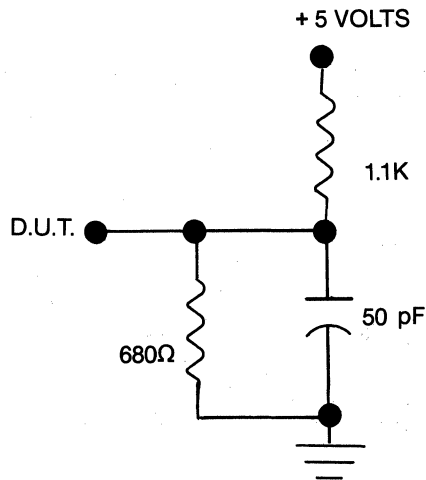
Water washing for flux removal may discharge internal lithium source as exposed voltage pins are present.

**NOTES:**

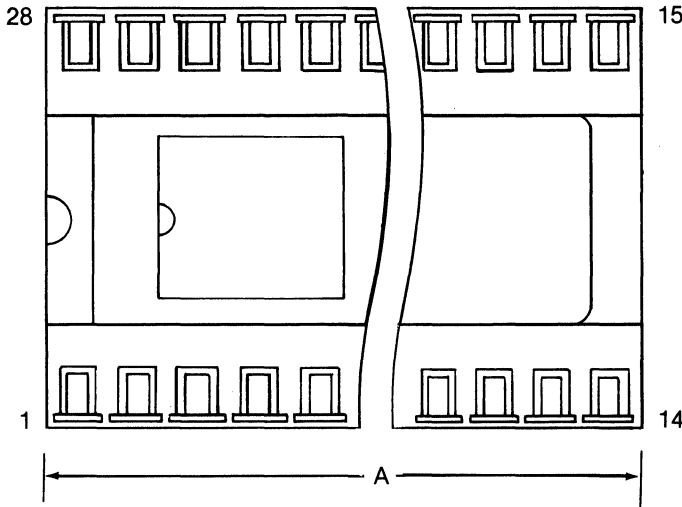
1. All voltages are referenced to ground.
2. Measured with a load as shown in Figure 1.
3. Pin locations are designated "U" when a parameter definition refers to the socket receptacle and "L" when a parameter definition refers to the socket pin.
4. No memory inserted in the socket.
5. Pin 26 L may be connected to  $V_{CC}$  or left disconnected at the P.C. board.
6.  $I_{BAT}$  is the maximum load current which a correctly installed memory can use in the data retention mode and meet data retention expectations of more than 10 years at 25°C.
7.  $t_{CE\ max}$  must be met to insure data integrity on power loss.
8.  $V_{CC}$  is within nominal limits and a memory is installed in the socket.
9. Input pulse rise and fall times equal 10 ns.

**OUTPUT LOAD**

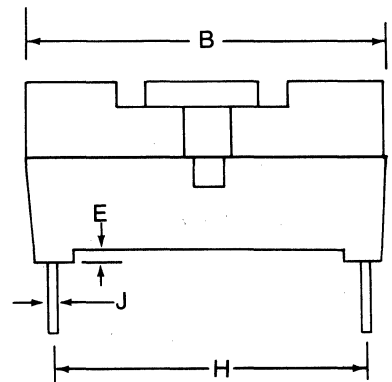
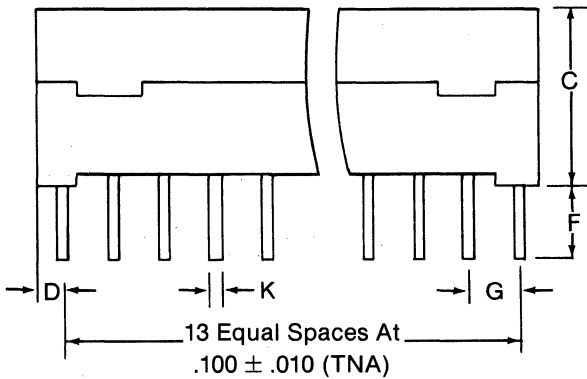
Figure 1



**DS1213**  
**SmartSocket**



DIM.	INCHES	
	MIN.	MAX.
A	1.390	1.420
B	.695	.720
C	.350	.385
D	.035	.065
E	.025	.035
F	.120	.160
G	.090	.110
H	.590	.630
J	.008	.012
K	.015	.021

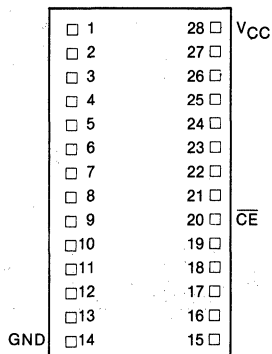


**6**

**FEATURES**

- Accepts standard 8K x 8 and 32K x 8 CMOS static RAMs
- Embedded lithium energy cell retains RAM data
- Self-contained circuitry safeguards data
- Data retention time is greater than 10 years with the proper RAM selection
- IC socket permits upgrading from 8K x 8 to 32K x 8 RAM
- Proven gas-tight socket contacts
- Operating temperature range 0°C to 70°C

**PIN CONNECTIONS**



**PIN DEFINITIONS**

- All pins pass through except 20, 28.
- Pin 20 conditioned Chip Enable
- Pin 28 switched V<sub>CC</sub>
- Pin 14 ground

**DESCRIPTION**

The DS1213C is a 28-pin, 0.6-inch-wide DIP socket with a built-in CMOS controller circuit and an embedded lithium energy source. It accepts either an 8K x 8 or a 32K x 8 JEDEC byte wide CMOS static RAM. When the socket is mated with a CMOS RAM, it provides a complete solution to problems associated with memory volatility. The SmartSocket monitors incoming V<sub>CC</sub> for an out-of-tolerance condition. When such a condition occurs, an internal lithium source is automatically switched on and write protection is unconditionally enabled to prevent garbled data.

Using the SmartSocket saves printed circuit board space since the combination of SmartSocket and memory uses no more area than the memory alone. The SmartSocket uses only Pins 28 and 20 for RAM control. All other pins are passed straight through to the socket receptacle.

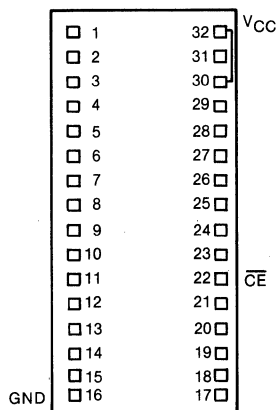
See the DS1213 data sheet for technical details.



**FEATURES**

- Accepts standard 8K × 8, 32K × 8, 128K × 8, and 512K × 8 CMOS static RAMs
- Embedded lithium energy cell retains RAM data
- Self-contained circuitry safeguards data
- Data retention time is greater than 10 years with the proper RAM selection
- IC socket permits upgrading from 128K × 8 to 512K × 8 RAM
- Proven gas-tight socket contacts
- Operating temperature range 0°C to 70°C

**PIN CONNECTIONS**



**PIN DEFINITIONS**

All pins pass through except 22, 30 and 32.

- Pin 22  $\overline{CE}$  - Conditioned Chip Enable
- Pin 32 V<sub>CC</sub> - Switched V<sub>CC</sub> for 32-pin RAM
- Pin 30 V<sub>CC</sub> - Switched V<sub>CC</sub> for 28-pin RAM
- Pin 16 GND - Ground

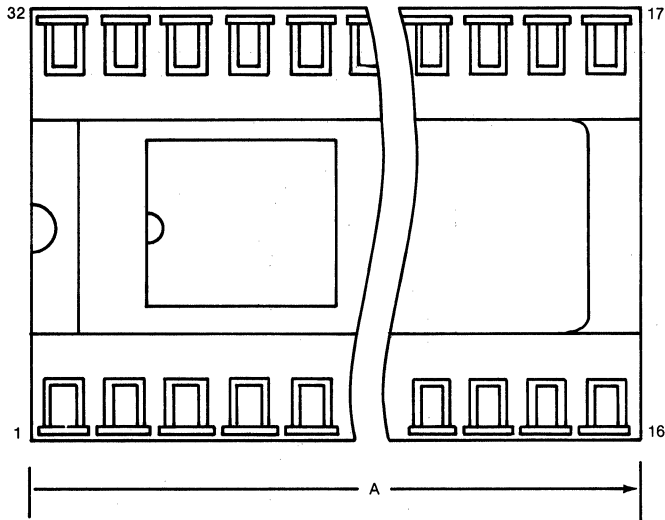
**DESCRIPTION**

The DS1213D is a 32-pin, 0.6-inch-wide DIP socket with a built-in CMOS controller circuit and an embedded lithium energy source. It accepts either an 8K × 8, 32K × 8, 128K × 8 or 512K × 8 byte wide CMOS static RAM. When the socket is mated with a CMOS RAM, it provides a complete solution to problems associated with memory volatility. The SmartSocket monitors incoming V<sub>CC</sub> for an out-of-tolerance condition. When such a condition occurs, an internal lithium source is automatically switched on and write protection is unconditionally enabled to prevent garbled data.

Using the SmartSocket saves printed circuit board space since the combination of SmartSocket and memory uses no more area than the memory alone. The SmartSocket uses only Pins 22, 30 and 32 for RAM control. All other pins are passed straight through to the socket receptacle.

See the DS1213 data sheet for technical details.

# DS1213D SmartSocket



DIM.	INCHES	
	MIN.	MAX.
A	1.590	1.620
B	.695	.720
C	.350	.385
D	.035	.065
E	.025	.035
F	.120	.160
G	.090	.110
H	.590	.630
J	.008	.012
K	.015	.021

